



Microwaves are also being applied to the removal of surface contamination from concrete. Microwave energy directed at a concrete surface heats the free water in the concrete matrix. Continued heating produces mechanical stress (induced by steam pressure) that causes the concrete surface to burst, a process known as scabbling. The concrete particles created by this process are small enough to be removed by conventional “vacuum cleaner” systems, but large enough that they do not create a dust problem. A mobile concrete scabbling system, shown above, is under development at ORNL.

Researchers are adapting rf and microwave sources to other environmental problems. Processing of radioactive waste is an essential ingredient in the Department of Energy’s plans to clean up former nuclear sites. These rf and microwave tools can provide safe, cost-effective solutions to a variety of problems.

High-power microwave heating systems like the one shown below are being used to consolidate radio active waste. Because microwaves heat materials directly, no heating elements or heat transfer surfaces are needed. The number of moving parts can be reduced, so highly reliable, low-maintenance processes can be developed. The microwave generators can be isolated from the radioactive process systems because the microwaves can be transmitted through waveguides.

A wiped-film evaporator that incorporates a 1/3-scale applicator using microwave power has been used to consolidate a surrogate (non radioactive) slurry at ORNL. Waste treated by this method meets the acceptance criteria for the Waste Isolation Pilot Plant, a federal repository in New Mexico for defense transuranic wastes.

Incinerator ash can be stabilized for long-term storage by means of vitrification—that is, heating it until it melts into a glassy substance. Microwave vitrification of surrogate ash has been demonstrated at ORNL.

